Application No.: 10/784,219

REMARKS

Claims 5-7 stand rejected under 35 U.S.C. § 103 as being unpatentable over Rumennik et al. '983 ("Rumennik") in view of Williams et al. '216 ("Williams"). As a preliminary matter, it is noted that the Examiner alleges that Applicant was allegedly "silent concerning the rejection of **Rumennik** in view of Williams." However, as stated in Applicants' prior response, Rumennik is simply the full disclosure on which APA is based (*see* page 1, line 10 of Applicant's specification) so that Applicants fully responded to the pending rejection of Rumennik in view of Williams. Claim 5 is independent. This rejection is respectfully traversed for the following reasons.

The Examiner's maintenance of this rejection, and the arguments in support thereof, is not understood. The Examiner does not appear to address the objection raised in Applicants' prior response; namely, Williams is completely silent as to the implantation energy *for an extended drain region*. The disclosed implantation energy of Williams is directed to a ***buried layer***, and is therefore, at best, attributable to the implantation energy for forming the buried layers 150 of Rumennik rather than the extended drain region 123.

In fact, on page 3 of the outstanding Office Action under the section "Response to Arguments," the Examiner admits that "Williams is used to disclose ... 'a ***buried*** layer 404 ... [formed] at an energy of 0.5 – 3.0 MeV'" (emphasis added), and concludes that "it would have been obvious to modify Rumennik in view of Williams to form the '***buried layers***'" (emphasis added). Accordingly, even assuming *arguendo* that all of the Examiner's allegations are true, the proposed combination nonetheless does not disclose or suggest "a first step of selectively implanting ... impurity ion of a ***second*** conductivity type with an implantation energy that is

equal to or greater than about 1.0 MeV and less than or equal to about 3.0 MeV so as to form an extended drain region of the ***second*** conductivity type ... .".

In contrast, at best, the proposed combination, ***as expressly indicated by the Examiner***, would suggest forming the plurality of ***buried layers*** 150 of Rumennik, each being an impurity layer of the ***first*** conductivity type, with the energy of 0.5 – 3.0 MeV disclosed in Williams. In other words, the teachings of Williams are related to the claimed second step and NOT the first step. Accordingly, the proposed combination does not disclose or suggest forming an extended drain region with energy of 0.5 – 3.0 MeV as recited in the first step of claim 5. Instead, the proposed combination at best discloses using 0.5 – 3.0 MeV energy for forming the buried layers in the second step of claim 5.

The Examiner should note that the extended drain region and buried layers are a second and first conductivity type, respectively. Accordingly, the impurity ions used to form buried layers 150 of Rumennik, as modified by the energy of Williams, would NOT correspond to the impurity ions used to form the extended drain region.

The aforementioned distinction between the present invention and cited prior art is representative of a broader difference therebetween. Williams discloses performing an ion implantation through a LOCOS (132), which is to serve as a gate oxide film, for the purpose of avoiding current pinching associated with the reduction in gate width. As a result of the ion implantation, a buried layer 404 is formed at a shallower depth directly under the gate and the layer reaches the N+ substrate 110, which is to serve as a drain, except for directly under the gate (*see* Figs. 8G to 8L of Williams). Performing the ion implantation through the gate electrode or the gate oxide film with the acceleration energy of 500keV to 3MeV is directed to the formation of the buried layer 404 along current paths flowing from a source region 123 on the substrate

surface to an inner drain region 110 and is designed to prevent an increase in resistance caused by current pinching from the substrate.

In contrast, the present invention can perform an ion implantation targeting, for example, a predetermined area at a side of the gate with the acceleration energy of about 1.0 MeV to 3.0 MeV, and can then perform, for example, an annealing process to form an extended drain region of a ***first*** conductivity type, and further form a buried layer of a ***second*** conductivity type in the extended drain region.

Moreover, Williams performs the ion implantation with the acceleration energy of 500 keV to 3 MeV for the purpose of controlling depth of the ion implantation, making it clear that Williams is NOT concerned with increasing the impurity concentration in the ***entire area*** of the extended drain region in the substrate. According to the present invention, the ions can be implanted at a deep position of the substrate using the ion implantation with high energy ***to form the extended drain region***. Therefore, the impurity concentration can be kept high in both the surface region and the bottom region of the substrate in the extended drain region.

Neither Rumennik nor Williams disclose the problem that, in a semiconductor having a MOS structure where a plurality of current paths are provided in the depth direction and where the current flows in the direction parallel to the surface of the substrate, the resistance increases due to the reduction of the impurity concentration in the current paths in the substrate. It follows that both Rumennik and Williams are completely silent as to suggesting a solution to the aforementioned problem; such as a structure where an ion implantation is performed with high acceleration energy, and as a result, an implantation peak can be formed at a deep position of the substrate, thereby suppressing the increase in resistance. Accordingly, even assuming *arguendo*

proper, the proposed combination does not disclose or suggest the claimed implantation energy for forming an ***extended drain region***.

The Examiner is directed to MPEP § 2143.03 under the section entitled "All Claim Limitations Must Be Taught or Suggested", which sets forth the applicable standard:

> To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. (citing *In re Royka*, 180 USPQ 580 (CCPA 1974)).

In the instant case, the pending rejection does not "establish *prima facie* obviousness of [the] claimed invention" as recited in claim 5 because the proposed combination fails the "all the claim limitations" standard required under § 103.

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 5 is patentable for the reasons set forth above, it is respectfully submitted that all claims dependent thereon are also patentable. In addition, it is respectfully submitted that the dependent claims are patentable based on their own merits by adding novel and non-obvious features to the combination.

Based on the foregoing, it is respectfully submitted that all pending claims are patentable over the cited prior art. Accordingly, it is respectfully requested that the rejections under 35 U.S.C. § 103 be withdrawn.

CONCLUSION

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If

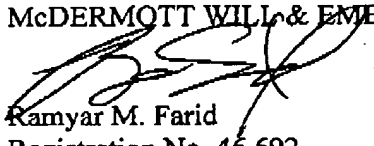
Application No.: 10/784,219

there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP



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